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770-101

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Patent
Attorney's Docket No. **006523-150**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

REQUEST FOR FILING
CONTINUATION/DIVISIONAL APPLICATION UNDER 37 C.F.R. § 1.60

Box PATENT APPLICATION
Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

This is a request for filing a [√] Continuation [ ] divisional application under 37 C.F.R. § 1.60 of pending Application No. 08/262,460 filed on June 20, 1994, for VISUAL LATCHING INDICATOR ARRANGEMENT FOR AN ELECTRICAL BUSHING AND TERMINATOR, by the following named inventor(s):

(a) Full Name Andrew Edgar MEYER

(b) Full Name Todd Kim KNAPP

(c) Full Name Frank John MUENCH

[ ] This application is being filed by less than all the inventors named in the prior application. In accordance with 37 C.F.R. 1.60(b), the Commissioner is requested to delete the name(s) of the following person or persons who are not inventors of the invention being claimed in this application.

(a) Full Name _____

(b) Full Name _____

(c) Full Name _____

1. [√] Enclosed is a copy of the latest inventor-signed prior application, including copies of the specification, claims, drawings and the executed oath or declaration as originally filed, and I hereby verify that the attached papers are a true copy of the latest inventor-signed prior Application No. 08/262,460 as originally filed on June 20, 1994. Further, I declare that all statements made herein of my own knowledge are true; that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

2. [ ] ___--- verified statement(s) claiming small entity status [ ] are enclosed [ ] were filed in prior Application No. __, filed on __.

3. [✓] The filing fee is calculated below [✓] and in accordance with the enclosed preliminary amendment:

CLAIMS					
	NO. OF CLAIMS		EXTRA CLAIMS	RATE	FEE
Basic Application Fee					$ 770.00
Total Claims	2	MINUS 20 =	---	x $22 =	---
Independent Claims	2	MINUS 3 =	---	x $80 =	---
If multiple dependent claims are presented, add $260.00					---
Total Application Fee					770.00
If small entity status is claimed, subtract 50% of Total Application Fee					---
Add Assignment Recording Fee of $40.00 if Assignment document is enclosed					---
TOTAL APPLICATION FEE DUE					**770.00**

4. [ ] Charge $_____ to Deposit Account No. 02-4800 for the fee due.

5. [✓] A check in the amount of $ 770.00 is enclosed for the fee due.

6. The Commissioner is hereby authorized to charge any appropriate fees under 37 C.F.R. §§ 1.16, 1.17 and 1.21 that may be required by this paper, and to credit any overpayment, to Deposit Account No. 02-4800. This paper is submitted in triplicate.

7. [ ] Cancel in this application original claims __ of the prior application before calculating the filing fee. (At least one original independent claim must be retained for filing purposes.)

8. [ ] Amend the specification:

9. [ ] Transfer the drawings from the pending prior application to this application and abandon said prior application as of the filing date accorded this application. A duplicate of this paper is enclosed for filing in the prior application file. (May only be used if signed by person authorized under 37 C.F.R. § 1.138 and before payment of issue fee.)

10. [√] Informal Drawings (Figs. 1-6) are enclosed.

11. [ ] Priority of Application No. __ filed on __ in __ (country) is claimed under 35 U.S.C. § 119.

[ ] The certified copy of the priority application [ ] is enclosed [ ] was filed on __ in prior Application No. __, filed on __ [ ] has not yet been filed.

12. [√] The prior application is assigned of record to

Cooper Industries, Inc., Houston, Texas [Reel 7055/Frame 0697].

13. [√] A Preliminary Amendment is enclosed.

14. [√] Also enclosed Drawing Amendment/Fig. 5;

Request for Express Abandonment/Serial No. 08/262,460.

15. [√] The power of attorney in the prior application is to

Alan E. Kopecki, Registration No. 25,813

William C. Rowland, Registration No. 30,888 .

a. [√] The power appears in the original papers in the prior application.

b. [ ] Since the power does not appear in the original papers, a copy of the power in the prior application is enclosed.

c. [ ] Recognize as Associate Attorney __.

d. [√] Address all future communications to: (May only be completed by applicant, or attorney or agent of record.)

Alan E. Kopecki, Esq.
BURNS, DOANE, SWECKER & MATHIS, L.L.P.
P.O. Box 1404
Alexandria, Virginia 22313-1404

March 20, 1997
Date

By: _____
Alan E. Kopecki
Registration No. 25,813

Address of signator:

BURNS, DOANE, SWECKER & MATHIS, L.L.P.
P.O. Box 1404
Alexandria, Virginia 22313-1404
(703) 836-6620

[ ] inventor(s)
[ ] assignee of complete interest
[√] attorney or agent of record
[ ] filed under 37 C.F.R. § 1.34(a)

VISUAL LATCHING INDICATOR ARRANGEMENT FOR AN ELECTRICAL BUSHING AND TERMINATOR

Related Invention

This is a Continuation-in-Part of Application Serial No. 08/038,335 filed March 19, 1993, now abandoned.

Background of the Invention

The present invention relates to the interconnection of electrical distribution elements and, in particular, to the interconnection between a loadbreak elbow terminator and a bushing.

Electrical distribution equipment, such as a deadfront switch gear arrangement, typically includes fixed electrical bushings which are to be connected to external electrical cables. The fixed bushings are mounted in a wall of the electrical equipment and have their outer ends arranged to be connected to the cables.

One way of achieving this connection is by inserting an elbow terminator onto the bushing, the terminator being coupled to the cable. The elbow terminator, which typically comprises a tapered socket in which an electrical probe is mounted, is intended to be inserted onto the fixed bushing such that a tapered tongue of the bushing enters the socket. In so doing, a conductive tube disposed within the tongue makes electrical connection with the probe, thereby connecting the cable to the fixed bushing.

The elbow terminator is secured to the bushing by means of a latching ring disposed at an inner end of the socket. That latching ring snaps into an annular latching groove formed in the outer periphery of the leading end of the tongue when the elbow terminator is pushed onto the fixed bushing.

The elbow terminator is maneuvered onto the bushing by means of a hand-held shotgun stick which grabs a hook eye affixed to the elbow terminator. It may occur, however, that the tongue does not completely enter the socket, whereby the latching ring does not tightly grip the latching socket. That unlatched condition, which is potentially dangerous, is difficult for the operator to visually detect, especially since the operator will likely be standing remotely (e.g., at least three to five feet) from the terminator and bushing, for safety reasons.

It would therefore be desirable to facilitate the ability of the operator to detect an unlatched condition, especially when standing remotely of the terminator and bushing.

Summary of the Invention

The present invention relates to the combination of an electrical terminator and an electrical bushing component. The terminator includes a socket, and the bushing component includes a tongue receivable in the socket to electrically interconnect the terminator and bushing. The tongue and socket include a latching arrangement for positively latching the bushing component and terminator together when the tongue enters the socket to a prescribed depth. First and second visual indicators are disposed on outer peripheries of the bushing component and the terminator, respectively. The first and second visual indicators are arranged so that when the terminator is longitudinally inserted onto the bushing, the first and second indicators longitudinally approach one another sufficiently to at least become radially aligned with one another in order to provide a visual indication of positive latching. One of the first and second indicators

is situated radially outside of the other of the indicator and is visible when the combination is viewed in a radially inward direction passing through the one indicator.

In another aspect of the invention, an indicator is defined by a color band formed on one of the terminator and bushing component (preferably on the bushing component) and is arranged to be radially covered by an indicator in the form of a covering portion of the other of the terminator and bushing component (preferably the terminator) when the tongue enters the socket to the prescribed depth, thereby providing a visual indication of positive latching.

The present invention also relates to an electrical bushing component which possesses the color band, and also to a method of connecting an electrical terminator to an electrical bushing component which involves causing the color band to be covered when positive latching occurs.

Brief Description of the Drawings

The objects and advantages of the invention will become apparent from the following detailed description of a preferred embodiment thereof in connection with the accompanying drawings in which like numerals designate like elements and in which:

FIG. 1 is a side elevational view of an elbow terminator and a bushing according to a first preferred embodiment of the invention, in a separated condition, and with the elbow terminator depicted in vertical section;

FIG. 2 is a view similar to FIG. 1 after the terminator has been inserted onto the bushing, a portion of the terminator being broken away;

FIG. 3 is a longitudinal sectional view taken through the bushing depicted in FIG. 1;

FIG. 4 is a plan view the terminator and bushing after they have been joined together;

FIG. 5 is a side elevational view of an elbow terminator and a bushing according to a second embodiment of the invention, in a separated condition, and with the elbow terminator partially broken away; and

FIG. 6 is a view similar to FIG. 5 of the second embodiment, after the terminator has been inserted onto the bushing.

Detailed Description of Preferred Embodiments of the Invention

Depicted in FIG. 1 is a loadbreak elbow terminator 10 and a bushing 12 adapted for connection therewith. The bushing can be of a type which is fixed to a stationary panel such that a tongue 22 is externally exposed. The elbow terminator includes a socket 14 formed in an electrical insulative material 16. The socket 14 includes a tapered portion 13 and merges into a cylindrical portion 15. Extending centrally along the socket is a probe 18 which carries an arc follower 20. The probe 18 is electrically connected to a cable 19.

The tongue 22 is configured to make an interference fit within the socket 14. Adjoining the tongue 22 is a cylindrical enlargement 24 configured to enter the socket portion 15. The tongue 22 is hollow and includes a contact tube 26 (see FIG. 3) in which are disposed an arc interrupter 28 and a contact sleeve 30.

An end of the tongue 22 includes a latching groove 32. When the elbow terminator is pushed onto the bushing 12, the latching groove 32 receives, by snap fit, a latching ring 34 formed on a semiconducting insert 35 at an inner end of the socket 14. In that fashion, the bushing becomes secured to the elbow terminator.

As thus far described, the elbow terminator 10 and bushing 12 are conventional. The elbow terminator is maneuvered onto the bushing 12 by a conventional shotgun stick (not shown) which is manipulated manually by an operator. The shotgun stick includes a hook which grips a hook eye 38 carried by the elbow terminator. As explained earlier, it may occur that the tongue does not fully enter the socket, so that the latching ring 34 does not completely enter the latching groove 32. In that event, the bushing could become dislodged from the elbow terminator 10.

That problem is avoided by the present invention which involves the addition of a visual indicating arrangement which visually indicates when the tongue has entered the socket to a sufficient longitudinal depth to ensure latching. The visual indicating arrangement comprises cooperative visual indicators positioned on the busing and elbow terminator such that the locations of the visual indicators relative to one another in the longitudinal direction is readily visible to the operator. When the visual indicators attain a certain longitudinal relationship, it is ensured that positive latching has occurred. The edge 56 is visible when the bushing 12 is viewed in a radially inward direction D passing through the edge 56, as is evident from FIGS. 3 and 4.

The visual indicators comprise an indicator gauge 40 disposed exteriorly on the bushing 12, and an indicator ring 42 disposed exteriorly on the elbow terminator 10. The indicator ring 42 encircles the outer periphery of the elbow terminal at the entrance to the recess 15 and forms a shoulder 44 which defines a mark in the form of an annular edge indicator or witness line 46.

The indicator gauge 40 includes an annular base portion 48 which encircles the outer periphery of the busing at a location remote from the leading end thereof, i.e., remote from the latching groove 32 for the preferred version.

Projecting radially inwardly from an inner diameter of the base portion 48 is an annular ridge 50 configured to snap into a corresponding annular depression formed in the bushing. The semiconductive ground shield 52 could be modified to provide an appropriate surface in which the annular depression can be formed. Alternatively, the semiconductive ground shield 52 could be modified to include the spaced tabs 54 as an integral, i.e., one-piece, part.

Projecting longitudinally from the base 48 is a plurality of circumferentially spaced tabs 54. Each tab 54 includes a beveled free end 55 which defines a mark in the form of a circumferentially extending indicator edge 56 at a radially inner portion of that free end 55. The tabs 54 are of a prescribed length so that when the tongue 22 enters the socket 14 to a longitudinal depth sufficient to ensure positive latching by the latching ring 34 and latching groove 32, the indicator edges 46, 56 will either be radially aligned with one another (as shown in FIG. 4) or pass one another (i.e., the indicator edges 56 would be disposed to the left of the indicator edge 46 in FIG. 4). Thus, an operator can tell, merely

by a visual inspection of the relative longitudinal locations of the edges 56, 46 whether positive latching has occurred.

The beveling of the free ends 55 of the tabs makes it easier for the operator to observe the indicator edges 56. By forming the tabs 54 on an annular base 48, the tabs can be conveniently mounted as a unit on the bushing. It will be understood by those skilled in the art that, depending upon the configuration of the outer periphery of the bushing, it may be possible to mold the bushing with tabs in lieu of providing a snap-on base 48 to which the tabs are mounted.

It may also be desirable to reverse the parts, i.e., to provide the gauge tabs 54 on the terminator and provide the indicator ring 42 on the bushing.

The indicator ring 42 could comprise an integral, one-piece portion of the terminator housing, or a separately attached piece.

It may be desirable to color the gauge tabs 54 differently from the indicator ring 42 in order to contrast the edges 46, 56 as much as possible and thereby, facilitate a proper observation by the operator.

While in the disclosed preferred embodiment the indicator gauge 40 is disposed on a bushing, it will be appreciated that the indicator gauge could also be disposed on a bushing insert which is to be mounted to a bushing. Bushings (such as, for example, LBC devices, standoffs, and one-piece bushings) and bushing inserts can be generically referred to as "bushing components".

A second embodiment of the invention, depicted in FIGS. 5 and 6, involves a loadbreak elbow terminator 100 and a bushing 112, wherein a visual indicator or mark 114 is provided on the bushing to cooperate with a visual indicator 116 provided on the terminator.

The visual indicator 116 on the terminator is defined by an end portion or end flange of the terminator which surrounds the cylindrical portion 115 of the terminator socket unto which a tongue 118 of the bushing is to be inserted.

The visual indicator 114 on the bushing is in the form of an annular color band of width W formed on the outer surface of the tongue 110 of the bushing. The color of the band 114 sharply contrasts with that of an adjacent portion 120 of the tongue 118 and also with that of the outer surface of the flange 116. Preferably, the band color is of a highly visible nature, such as a bright dayglow color like yellow, orange, lime green, etc., which is readily visible from at least a three to five foot distance. The color of an adjacent portion of the tongue would be formed of a contrastingly dark color such as brown or gray.

The band 114 forms an edge indicator or witness line 122 at its junction with the adjacent portion 120 of the tongue. Likewise, the end flange 116 of the terminator defines an edge indicator 124.

The relationship between the edge indicators 122, 124 is such that when the terminator is longitudinally inserted onto the bushing sufficiently far for positive latching to occur in the manner described earlier herein, the edge indicators 122, 124 will have longitudinally approached one another sufficiently to be at least radially aligned with one anther. That is, when positive latching has occurred, the color band 114 will be completely disposed within the socket portion 115 and no longer visible.

That indication will be discernable by an operator who views the bushing in a radial direction (i.e., radially with reference to the longitudinal axis thereof), from a distance of at least three to five feet. This enables the operator to maintain a safety distance while determining that latching has occurred.

The color band 114 can be applied in any suitable manner, preferably by applying a colored ink by means of a roller traveling around the outer periphery of the tongue. The band 114 is preferably circumferentially continuous, but it could be interrupted as well, since it is only required that the band be at least partly visible when there is no positive latching, and be invisible when there is positive latching.

Although the present invention has been described in connection with preferred embodiments thereof, it will be appreciated by those skilled in the art that additions, deletions, modification, and substitutions not specifically described may be made without departing from the spirit and scope of the invention as defined in the appended claims.

WHAT IS CLAIMED IS:

1. In combination, an electrical terminator and an electrical bushing component, said terminator including a socket defining a longitudinal axis, and said bushing component including a tongue receivable in said socket to electrically interconnect said terminator and bushing, said tongue and socket including latching means for positively latching said bushing component and terminator together when said tongue longitudinally enters said socket to a prescribed depth, and first and second visual indicators formed on outer peripheries of said bushing component and said terminator, respectively, said first and second visual indicators defining first and second indicators, respectively, said first and second indicators being arranged so that when said terminator is longitudinally inserted onto said bushing, said first and second indicators longitudinally approach one another sufficiently to at least become radially aligned with one another in order to provide a visual indication of positive latching, one of said first and second indicators being situated radially outside of the other of said indicators and being visible when said combination is viewed in a radially inward direction passing through said one indicator.

2. The combination according to Claim 1, wherein said other of said first and second indicators is defined by a color band, said one of said first and second indicators is defined by a flange which covers said color band when positive latching occurs.

3. The combination according to Claim 2, wherein said color band is disposed on said bushing component, said flange formed by an end portion of said terminator.

4. The combination according to Claim 2, wherein said color band is circumferentially continuous to define an annular band, said flange being circumferentially continuous.

5. A combination according to Claim 1, wherein said first and second indicators comprise first and second circumferentially extending indicator edges, respectively.

6. A combination according to Claim 2, wherein one of said first and second indicator edges is defined by a plurality of longitudinally extending gauge tabs.

7. A combination according to claim 6, wherein each of said gage tabs defines a said first indicator edge.

8. A combination according to Claim 7 including an annular base, said gauge tabs being carried by said annular base.

9. A combination according to Claim 8, wherein said annular base is mounted on said bushing component by a snap fit so as to be longitudinally movable therewith.

10. A combination according to Claim 8, wherein said gauge tab includes a beveled free end defining said first indicator edge.

11. A combination according to Claim 1, wherein said latching means comprises a latching ring and a latching groove attachable by a snap fit.

12. A combination according to Claim 11, wherein said latching ring is disposed adjacent an inner end of said socket, said latching groove disposed adjacent a leading end of said tongue.

13. In combination, an electrical terminator and an electrical bushing component, said terminator including a socket, and said bushing component including a tongue receivable in said socket to electrically interconnect said terminator and bushing, said tongue and socket including latching means for positively latching said bushing component and terminator together when said tongue longitudinally enters said socket to a prescribed depth, a color band formed on one of said terminator and bushing component and arranged to be radially covered by a covering portion of the other of said terminator and bushing component when said tongue enters said socket to said prescribed length to provide a visual indication of positive latching.

14. The combination according to Claim 13, wherein said color band is formed on said tongue, said covering portion defined by a socket-forming portion of said terminator.

15. An electrical bushing component comprising a tongue configured to enter and become positively latched within a socket of an electrical terminator, said tongue including a circumferentially extending color band positioned to be completely disposed within the socket when positive latching occurs, said color band being of a color contrasting with an adjacent portion of said tongue.

16. A method of connecting an electrical terminator to an electrical bushing component comprising the steps of:

inserting a socket of said terminator longitudinally into a tongue of said bushing component until latching elements on said tongue and in said socket come into positive latching engagement, and

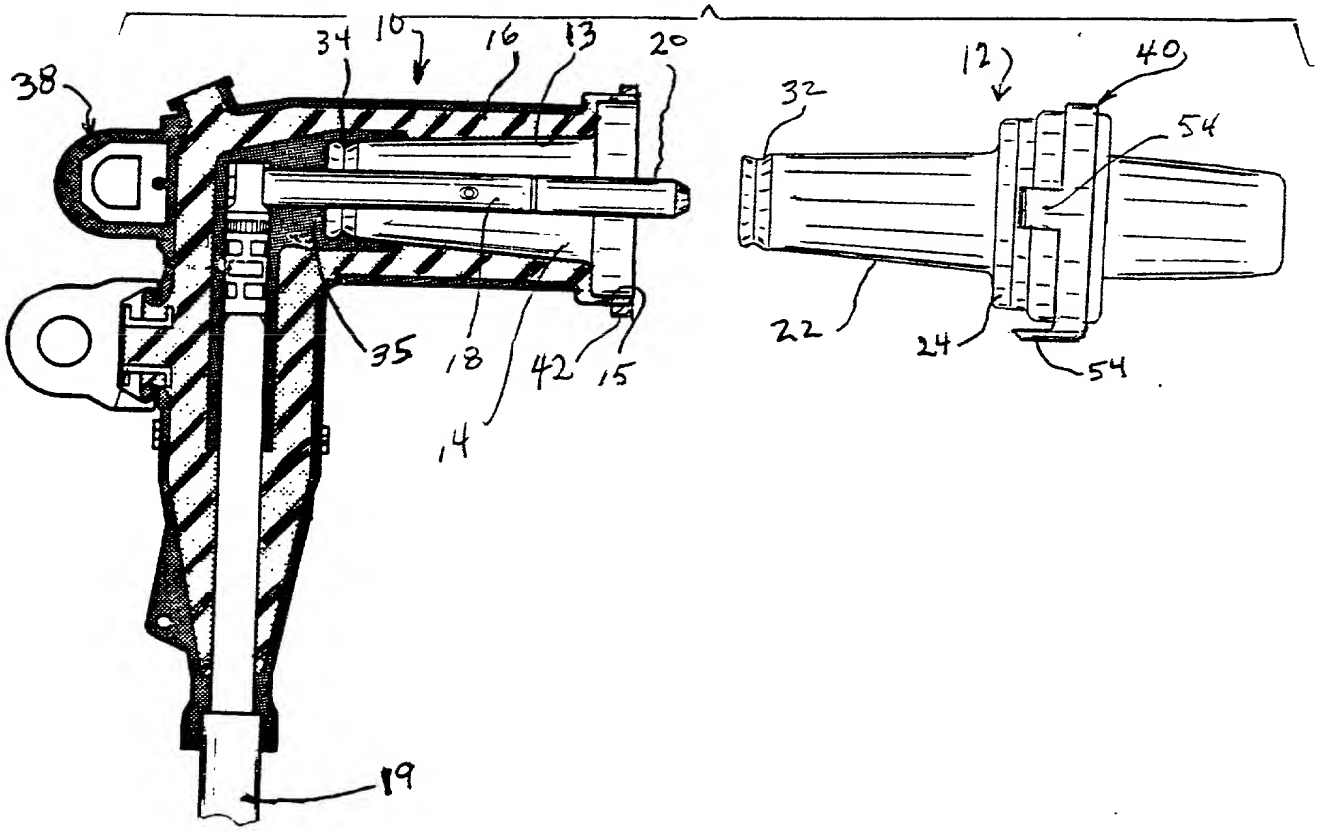
visually indicating that positive latching has occurred by causing a color band on one of said terminator and said bushing element to be covered by a portion of the other of said terminator and said bushing when positive latching occurs.

17. A method according to Claim 16, wherein said visually indicating step comprises causing a color band on said tongue to be covered by a socket-defining portion of said terminator.

Abstract of the Disclosure

An elbow terminator has a socket in which an electrical probe is disposed. The terminator is insertable onto an electrical bushing such that a tongue of the bushing is received in the socket of the terminator, and the probe of the terminator is electrically coupled to a contact sleeve disposed within the tongue. A latching mechanism produces positive latching between the tongue and socket when the tongue has been inserted to a predescribed depth within the socket. In order to enable an operator to visually observe that the tongue has been inserted to the prescribed depth, the bushing carries a color band which becomes completely disposed (invisible) in the socket when positive latching occurs. Alternatively, the bushing can be provided with gauge tabs which become aligned with a witness line formed on the terminator when positive latching occurs.

FIG. 1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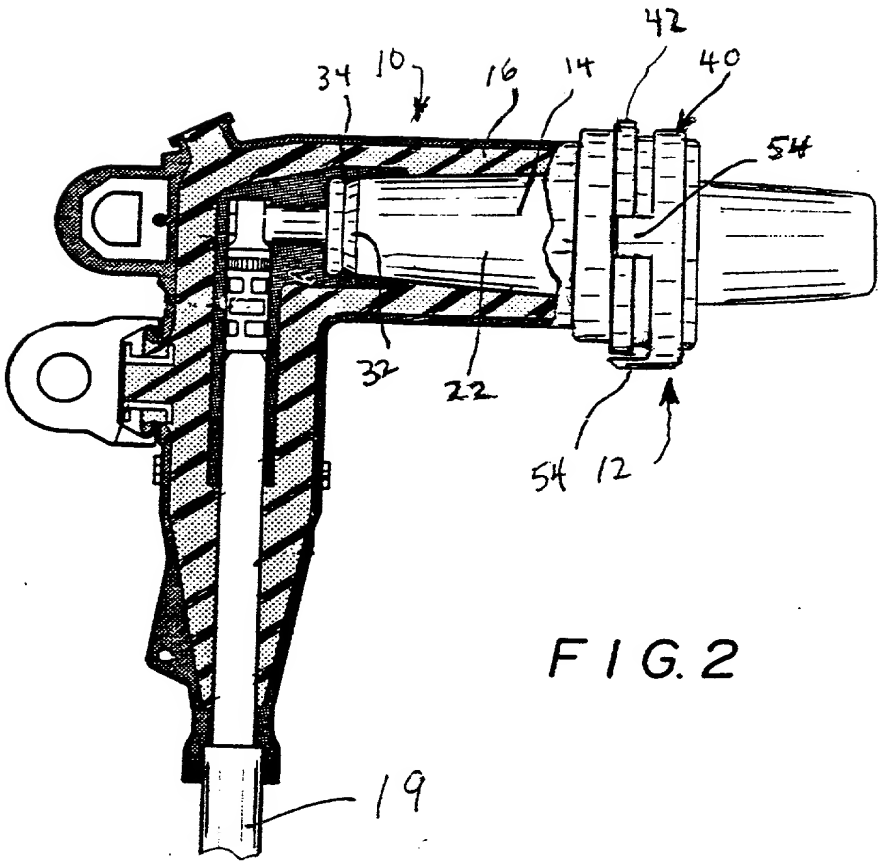
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FIG. 2

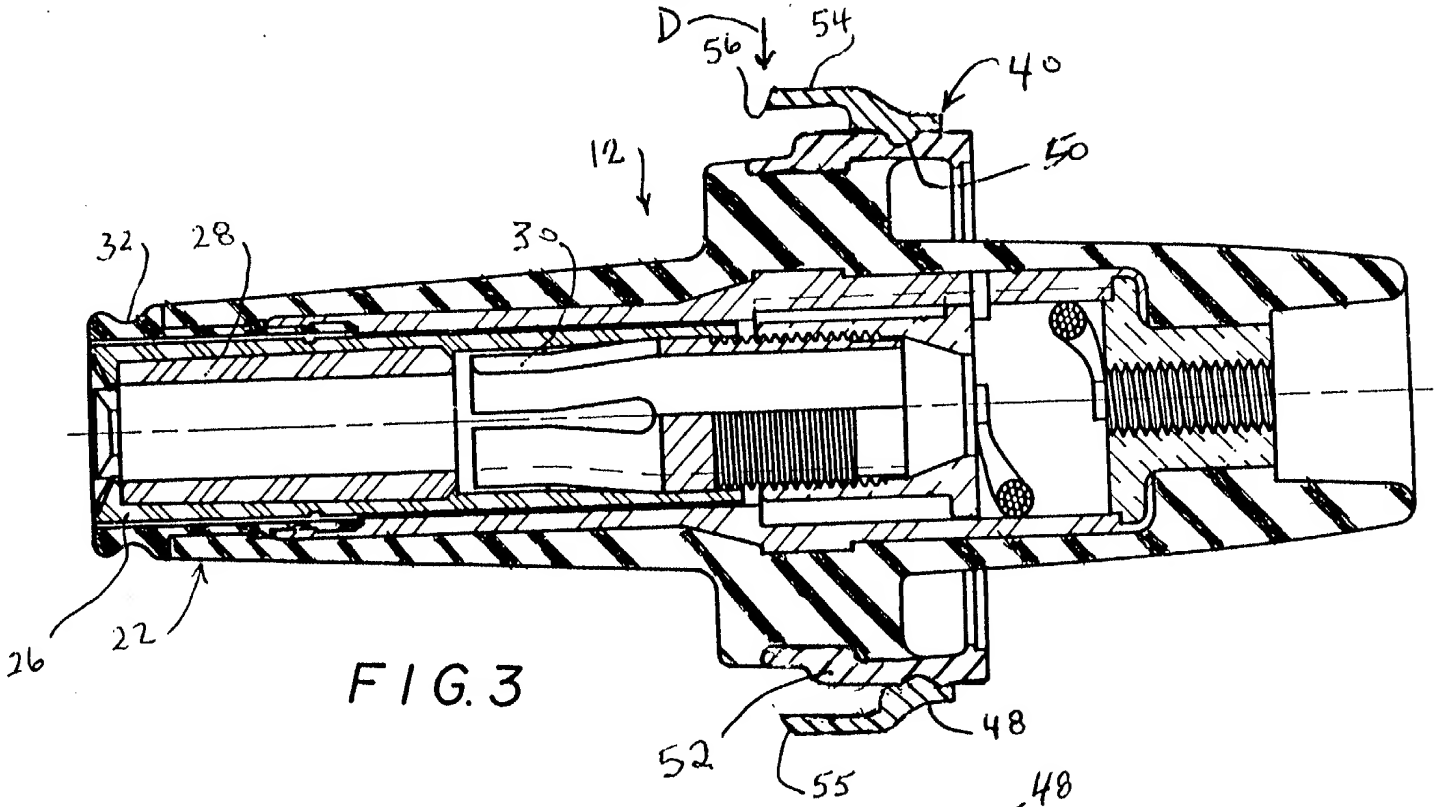


FIG. 3

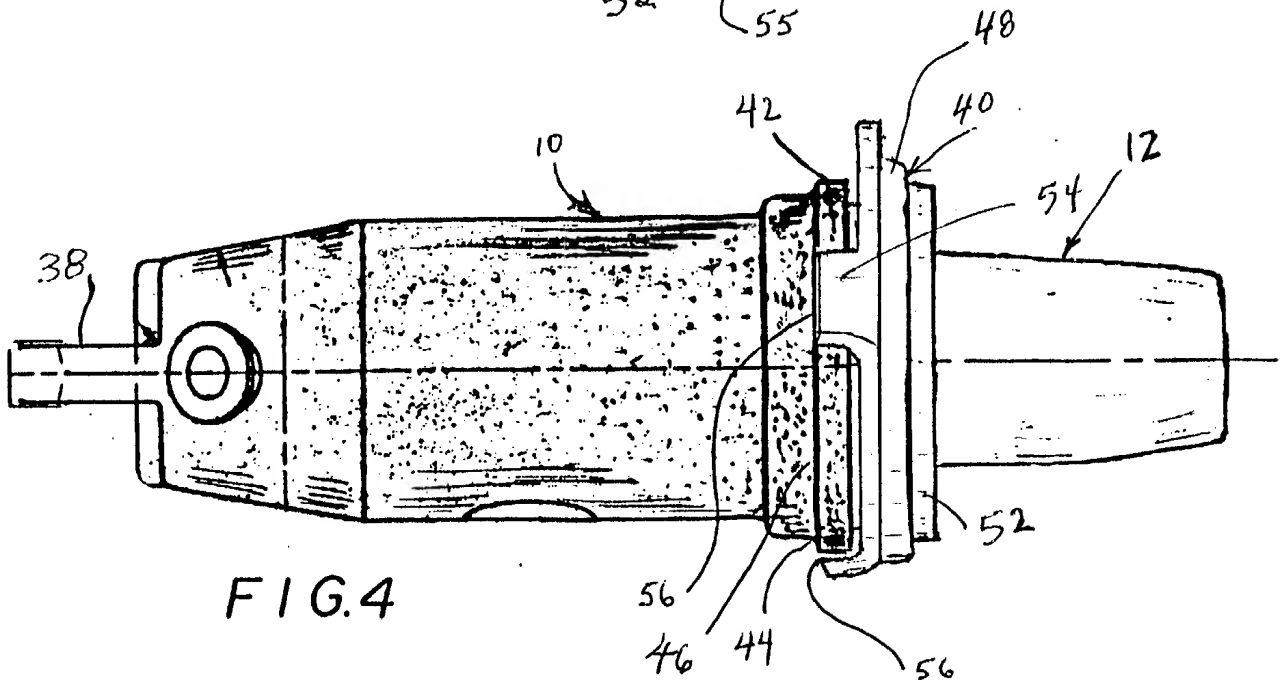


FIG. 4

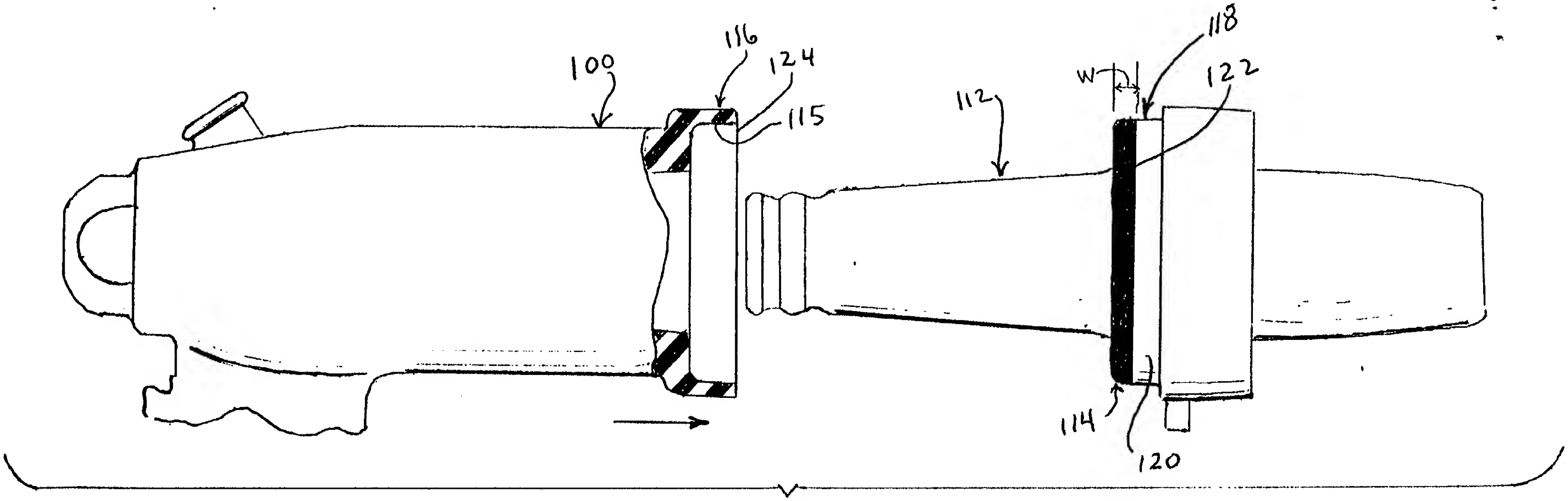
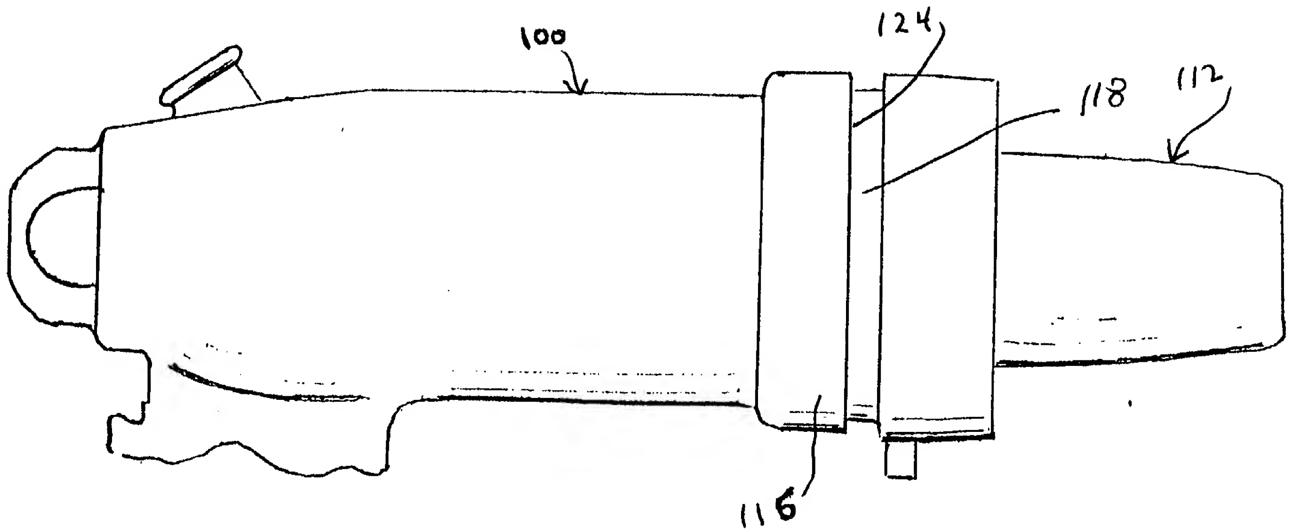


FIG.5

FIG.6



COMBINED DECLARATION FOR PA .T APPLICATION AND POWER OF ATTORN
(Includes Reference to PCT International Applications)

ATTORNEY'S DOCKET NUMBER
006523-150

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

VISUAL LATCHING INDICATOR ARRANGEMENT FOR AN ELECTRICAL BUSHING AND TERMINATOR

the specification of which (check only one item below):

☐ is attached hereto.

☑ was filed as United States application

Serial No. 08/262,460

on June 20, 1994

and was amended

on _____ (if applicable).

☐ was filed as PCT international application

Number _____

on _____

and was amended under PCT Article 19

on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:

PRIOR FOREIGN/PCT APPLICATION(S) AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. §119:

COUNTRY (if PCT, indicate "PCT")	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 35 U.S.C. §119
			__ Yes __ No
			__ Yes __ No
			__ Yes __ No
			__ Yes __ No
			__ Yes __ No

COMBINED DECLARATION FOR PA IT APPLICATION AND POWER OF ATTORI (CONTINUED)
(Includes Reference to PCT International Applications)

ATTORNEY'S DOCKET NO. 006523-150

I hereby claim the benefit under Title 35, United States Code, §120 of any United States applications(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose to the Office all information known to me to be material to the patentability as defined in §1.56, which became available between the filing date of the prior application(s) and the national or PCT international filing date of this application:

PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS DESIGNATING THE U.S. FOR BENEFIT UNDER 35 U.S.C. 120:

U.S. APPLICATIONS		STATUS (check one)		
U.S. APPLICATION NUMBER	U.S. FILING DATE	PATENTED	PENDING	ABANDONED
08/038,335	03/19/93		✓	

PCT APPLICATIONS DESIGNATING THE U.S.					
PCT APPLICATION NO.	PCT FILING DATE	U.S. SERIAL NUMBERS ASSIGNED (if any)			

I hereby appoint the following attorneys and agent(s) to prosecute said application and to transact all business in the Patent and Trademark Office connected therewith and to file, prosecute and to transact all business in connection with international applications directed to said invention:

William L. Mathis	17,337	Regis E. Slutter	26,999	James W. Peterson	26,057
Peter H. Smolka	15,913	Samuel C. Miller, III	27,360	Teresa Stanek Rea	30,427
Robert S. Swecker	19,885	Ralph L. Freeland, Jr.	16,110	Robert E. Krebs	25,885
Platon N. Mandros	22,124	Robert G. Mukai	28,531	Robert M. Schulman	31,196
Benton S. Duffett, Jr.	22,030	George A. Hovanec, Jr.	28,223	William C. Rowland	30,888
Joseph R. Magnone	24,239	James A. LaBarre	28,632	T. Gene Dillahunty	25,423
Norman H. Stepno	22,716	E. Joseph Gess	28,510	Anthony W. Shaw	30,104
Ronald L. Grudziecki	24,970	David D. Reynolds	29,273	Patrick C. Keane	32,858
Frederick G. Michaud, Jr.	26,003	R. Danny Huntington	27,903	Bruce J. Boggs, Jr.	32,344
Alan E. Kopecki	25,813	Eric H. Weisblatt	30,505		

and: _____

Address all correspondence to: **Alan E. Kopecki, Esq.**
Burns, Doane, Swecker & Mathis
P.O. Box 1404
Alexandria, Virginia 22313-1404

Address all telephone calls to: **Alan E. Kopecki** at (703) 836-6620.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

FULL NAME OF SOLE OR FIRST INVENTOR **Andrew Edgar MEYER**	SIGNATURE		DATE 8/8/94
RESIDENCE **Milwaukee, Wisconsin**		CITIZENSHIP U.S.	
POST OFFICE ADDRESS **1752A N.56th, Milwaukee, Wisconsin 53208**			
FULL NAME OF SECOND JOINT INVENTOR, IF ANY **Todd Kim KNAPP**	SIGNATURE		DATE 8/9/94
RESIDENCE **Waukesha, Wisconsin**		CITIZENSHIP U.S.	
POST OFFICE ADDRESS **W270 S3935 Heather Drive, Waukesha, Wisconsin**			
FULL NAME OF THIRD JOINT INVENTOR, IF ANY **Frank John MUENCH**	SIGNATURE		DATE 8/8/94
RESIDENCE **Waukesha, Wisconsin**		CITIZENSHIP U.S. Yes	
POST OFFICE ADDRESS **2601 Minot Lane, Waukesha, Wisconsin 53188**			

(BDSM 44)
(1/94)